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## CERTIFICATE

This certificate is issued in support of an application for Patent registration in a country outside New Zealand pursuant to the Patents Act 1953 and the Regulations thereunder.

I hereby certify that annexed is a true copy of the Provisional Specification as filed on 24 October 2002 with an application for Letters Patent number 522229 made by MACHINERY DEVELOPMENTS LIMITED.

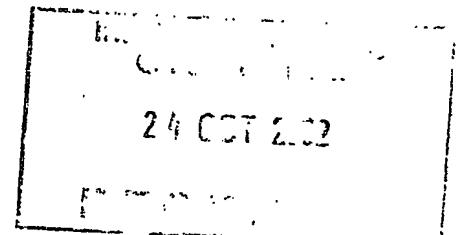
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Dated 5 November 2003.



Neville Harris  
Commissioner of Patents, Trade Marks and Designs





Patents Form No. 4

Our Ref: MH504108

Patents Act 1953

PROVISIONAL SPECIFICATION

**LOADER AND PACKAGING APPARATUS**

We, **MACHINERY DEVELOPMENTS LIMITED**, a New Zealand company, of 8c  
Tagalad Road, Mission Bay, AUCKLAND 1005, NEW ZEALAND do hereby  
declare this invention to be described in the following statement:

PT0459001

## Loader and Packaging Apparatus

### Technical Field

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This invention relates to apparatus for loading product into packages. In particular, but not exclusively, the present invention relates to a packaging apparatus for packaging product inside bags.

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### Background

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In packaging apparatus, particularly packaging apparatus in a processing line such as a meat processing line, there is a need to minimise the manual handling of product to be packaged. In a meat processing line, for example, manual handling of product is undesirable, as it involves a higher variable cost than automated systems and also there may be an increased risk of cross-contamination of product. In addition, the meat processing industry may be experiencing a shortage of willing staff to handle products such as meat carcasses.

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In United States Patent No. 5,618,252 a packaging apparatus is described that includes a bag forming mechanism that forms bags from plastics tubing. The bags are held on a conveyor by suction and blown open by compressed air to facilitate loading of articles such as cuts of meat into the bag. A loading fork may also be provided that carries the articles and moves at least partially into the blown open bag. However, this apparatus still requires an operator to manually complete the bagging process by pulling the bag over the loading fork.

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In International Publication Number WO 02/076832, an apparatus and method for loading objects into packages is described. The apparatus includes a movable loading fork and a loading horn. The loading horn holds bags in the open position and the loading fork travels through the loading horn, thereby locating articles on the loading fork within the bag. The loading fork is inverted after receipt of a bag, to allow the bagged article to be conveyed away off the loading fork. A disadvantage of this system is that it is not particularly suited to smaller bags.

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In International Publication No. WO 02/053479, a loading fork and a system for

transferring objects off the loading fork onto a conveyor is described. This system goes some way to avoiding handling of articles after bagging, but it does not provide assistance for the actual bagging operation.

5 It is thus an object of the present invention to provide a loader and/or a packaging apparatus that overcomes or alleviates problems in loaders and/or packaging apparatus at present or at least to provide the public with a useful alternative.

### Summary of the Invention

10 According to one aspect of the present invention, there is provided packaging apparatus including a loader and a bag receiver, the bag receiver operable to hold open an end of a bag to receive product from said loader and transport means to move said loader and said bag receiver relative to each other so that an article on the loader is moved into the bag held by the bag receiver, wherein said loader includes a support for said articles and two longitudinal sides transversely movable relative to each other.

15 Preferably, the longitudinal sides include upwardly depending flanges from said support.

20 Preferably, the packaging apparatus includes drive means for said loader operable to move said longitudinal sides together against product located on said support.

25 Preferably, in use the drive means may cause the longitudinal sides to apply a predetermined pressure onto product on said support prior to stopping its operation to move said longitudinal sides together.

30 Preferably, said bag receiver may include at least two arms to receive a bag, the arms movable relative to each other, wherein in use, the arms automatically move to a separation dependent on the separation of said longitudinal sides of said loader as said loader approaches said bag receiver.

35 Preferably, said bag receiver may include one or more further arms and means to move said at least two arms and at least one further arm relative to each other vertically in order to open a bag placed thereon in the vertical direction.

Preferably, the loader and bag receiver may be movable relative to each other so that the support and longitudinal sides of the loader moves through an area defined by the arms of the bag receiver.

5 Preferably, the loader is invertible and the packaging system allows the longitudinal sides to separate after said loader has been inverted.

10 Preferably, said loader includes a means to maintain said longitudinal sides in their position after said drive means has ceased moving the longitudinal sides together and includes a release for said means to maintain said longitudinal sides in their position, the release operable when said loader is inverted.

15 According to one embodiment, the bag receiver may include a bag conveying means located above and adjacent to said loader and including a downward facing surface for holding and conveying bags, the bag conveying means in use maintaining bags open in line with the direction of travel of said loader in order to receive said loader.

20 Preferably, said bags are held by said conveying means by vacuum pressure.

25 Preferably, said bags are opened by said conveying means through the use of compressed air applied to the bags.

25 Preferably, said conveying means is fed by a bag supply that locates the bags onto the transverse side of the conveying means from said loader.

30 According to another aspect of the present invention, there is provided a method of packaging product into bags, the method including locating product onto a loader having a support for said product and longitudinal sides movable relative to each other in a transverse direction, moving the longitudinal sides together against said product, holding open an end of a bag and moving said loader into the bag.

35 Preferably, the method includes using said longitudinal sides to apply a predetermined pressure onto said product prior to moving the loader into the bag.

35 Preferably, the method includes holding the bag open to an extent approximately commensurate with the resulting separation of said longitudinal sides after said step of

moving the longitudinal sides together.

Further aspects of the present invention, which should be considered in all its novel aspects, may become apparent from the following description, given by way of example only and with reference to the accompanying drawings.

#### Brief Description of the Drawings

Figure 1: Shows a perspective view of a packaging apparatus in accordance with an aspect of the present invention.

Figure 2: Shows a top view of the packaging apparatus shown in Figure 1.

Figure 3: Shows a side view of the packaging apparatus for Figure 1.

Figure 4: Shows a perspective front view of the loader of the packaging apparatus of Figure 1 in the open position.

Figure 5: Shows the top view of the loader of Figure 4.

Figure 6: Shows a front view of the loader of Figure 4.

Figure 7: Shows a perspective front view of the loader of the packaging apparatus of Figure 1 in the closed position.

Figure 8: Shows a top view of the loader of Figure 7.

Figure 9: Shows a front view of the loader of Figure 7.

#### Detailed Description of the Drawings

The present invention relates to packaging apparatus. In particular, the present invention may have application to the provision of an automated packaging apparatus for locating product inside bags. The following description is given with reference to a particular implementation of the present invention in relation to the bagging of meat cuts. However, the present invention may also be applied to the packaging of other products.

Referring to Figure 1 of the accompanying drawings, a perspective view of a packaging apparatus 100 according to an embodiment of the present invention is shown. The packaging apparatus 100 includes two loaders 1A, 1B for receiving articles to be packaged and a bag receiver 2 for receiving and holding bags (not shown). The loader 1 and bag receiver 2 are movable relative to each other and are supported on a frame 3.

The frame 3 includes feet 4. From the feet 4 extend legs 5 and the legs 5 at each end of the packaging apparatus 100 terminate at a cross member 6. Extending between the cross members 6 are rails 7, along which the loaders 1A, 1B may travel. A belt, chain, pulley system or other drive means (not shown) may be used to move the loaders 1A, 1B along the top of the rails 7 in direction A and along the bottom of the rails 7 in direction B. The frame 3 includes a spacer 8 to separate the ends of the packaging apparatus 100 and a brace 9 may be provided between the legs 5 if required. The rails 7 are mounted on the cross members 6 through plates 10, axles 11 and blocks 12. The rails 7 may be rotated about their longitudinal axis A. A motor (not shown) may drive a drive wheel 13 through a belt in order to effect this rotation. Thus, the loaders 1A and 1B may move in a reciprocating action along the packaging apparatus 100 above and below the rail 7.

Further provided on the frame 3 is a loader clamp 14. The loader claim 14 includes clamps 15 supported by arms 16. The separation of the clamps 15 is controlled by a ram 17. As is described in more detail herein below, the loader clamp 14 controls the width of the loaders 1A and 1B as they travel through the bag receiver 2.

The bag receiver 2 is located on support members 18A and 18B. Support member 18B is movable vertically upwards relative to support member 18A by pneumatic rams 19. The bag receiver 2 includes two lower arms 20 attached to support member 18A and two upper arms 21 attached to support member 18B.

Figures 2 and 3 show a top view and a side view respectively of the packaging apparatus 100.

Referring to Figures 4-6, an expanded view of the loader 1A in an open position is shown. The loader 1A includes a central support 22 and two arms 23A and 23B, which terminate in flanges 24A and 24B respectively. As can be best seen in Figures 4 and 6, the arms 23A and 23B can slide into slots 25 and 26 respectively in order to allow the

flanges 24A and 24B to move inwards and outwards relative to the support 22.. The loader 1A includes a support assembly 27 that locates the loader 1A on the rail 7. Referring particularly to Figure 6, the flanges 24A and 24B may be connected to guide members 28A and 28B respectively, which are biased outwardly by springs 29A and 29B. When the arms 23A and 23B are moved inwardly, which may be achieved by direct pressure to either or both of the flanges 24A and 24B and stops 31A, 31B, a ratchet (not shown) engages with teeth 30A and 30B to retain the arms 23A and 23B and flanges 24A and 24B in their position against the bias of springs 29A and 29B. Forms of catch other than a ratchet may be used, including frictional engagement or pneumatic rams provided on each loader 1A, 1B to hold the arms 23A and 23B in position. If pneumatic rams are provided on each loader, then the loader clamp 14 may be omitted, with the functions of the loader clamp 14 replaced by the pneumatic rams.

While the loaders 1A, 1B are shown having a generally flat base and vertically extending flanges 24A, 24B, those skilled in the relevant arts will appreciate that various other profiles may be provided. For example, the loaders may have a concave base. Also, the way that the arms 23A and 23B move together may be varied, with the use of slots 25, 26 not being essential.

Figures 7 to 9 show the loader 1A in a fully closed position, with the separation of the flanges 24A, 24B at a minimum. Those skilled in the relevant arts will appreciate that different structures of loaders may be made that allow increased range of separation of the flanges 24A, 24B. However, the structure described herein is anticipated to be suitable for at least the purpose of loading meat cuts into bags.

In operation, the loader 1A receives product from a conveyor (not shown) or other product transport means. The loader 1A may commence movement along rails 7 in direction A (see Figure 1) in synchronism with the travel of the conveyor. Once the product has been received by the loader 1A, it moves along rails 7 until it is adjacent to the loader clamp 14. The clamps 15 then move inwards, abutting either the flanges 24A or 24B or stops 31A or 31B to move the arms 23A and 23B inwards. The loader clamp 14 applies a preset pressure to the loader 1A so that the flanges 24A and 24B apply the same pressure to the product. This may result in the product, which may be a cut of meat, changing its cross-sectional shape, allowing a smaller bag to be used. The ratchet system engages teeth 30A and 30B to retain the arms 23A and 23B in position after the clamps 15 have disengaged from the loader 1A.

During this time, a bag is loaded onto a bag receiver 2. This may be achieved by an operator retrieving a bag from a bag making apparatus. Once the bag has been placed over the lower arms 20 and upper arms 21, the lower arms 20 move outwards as indicated by arrows C and D to approximately the same width as the separation of the flanges 24A and 24B after they have been moved together by the loader clamp 14. Some clearance may be provided if required. The upper arms 21 then move upwards, thereby opening the bag ready for receipt of the loader 1A. The loader 1A then moves further along rails 7 through the bag receiver 2, in which case the support 22 and arms 23A and 23B move into the bag. The loader 1A continues moving along rails 7, taking the bag off the bag receiver 2 so that the bag encapsulates the upper portion of the loader 1A and the product located thereon.

When the loader 1A reaches the end of the rails 7, the rails 7 are inverted so that loader 1A is in the position that loader 1B occupies in Figure 1. In this position, the bag is held suspended from the loader 1A, at which time it may be conveyed off the loader 1A and away from the packaging apparatus 100. The loader 1A then travels back along rails 7 and is then inverted to return to its original position for receiving further product. Loader guides 32 may be provided to move the arms 23A, 23B of the loader 1A inwards as it travels back along rails in order to ensure that the loader 1A can fit through the loader clamp 14. If pneumatic rams or other drive means for are provided on each loader, then these could replace the operation of the loader guides 32.

In one embodiment, the dimensions of the product are measured prior to the product being received by the packaging apparatus 100. This allows a bag of appropriate dimensions to be produced in advance. Measurement of the dimensions of the product may be achieved by an optical scanning device, located upstream of the apparatus 100 in the processing line. The bag receiver 2 may optionally also receive the product dimensions, in particular the width of the product so that the lower arms 20 can be moved to a separation equivalent to the product width plus some amount of clearance.

Alternatively, the bag making apparatus may use the position of the arms 23A and 23B after they have been moved together to determine the appropriate sized bag and the bag receiver 2 may use also use the position to set the position of lower arms 20, which may be achieved through direct mechanical engagement, by pneumatic or electronic control or otherwise. This embodiment may result in the bag making apparatus becoming

the slowest operation in the processing line. However, some reduced capital costs may result by measuring the width of cuts in this way, and any delay may be reduced by increasing the length of rails 7 and increasing the separation between the loader clamp 14 (or position where the arms 23A, 23B are moved together) and the bag receiver 2.

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More than two loaders 1 may be provided with appropriate modification of the rail system on which the loaders travel to enable only the loaders at the ends of the rails to be inverted, leaving any that are part way along the rails in the same orientation. This may also assist to increase the throughput of the apparatus 100.

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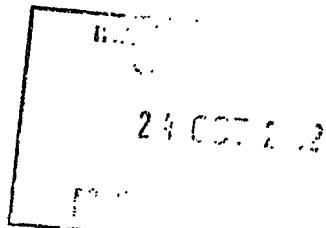
Where in the foregoing description, reference has been made to specific components or integers having known equivalents, then such equivalents are incorporated herein as if individually set forth.

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Although the above description has been given by way of example with reference to possible embodiments of the invention, it is to be understood that modifications or improvements may be made without departing from the scope of the invention.

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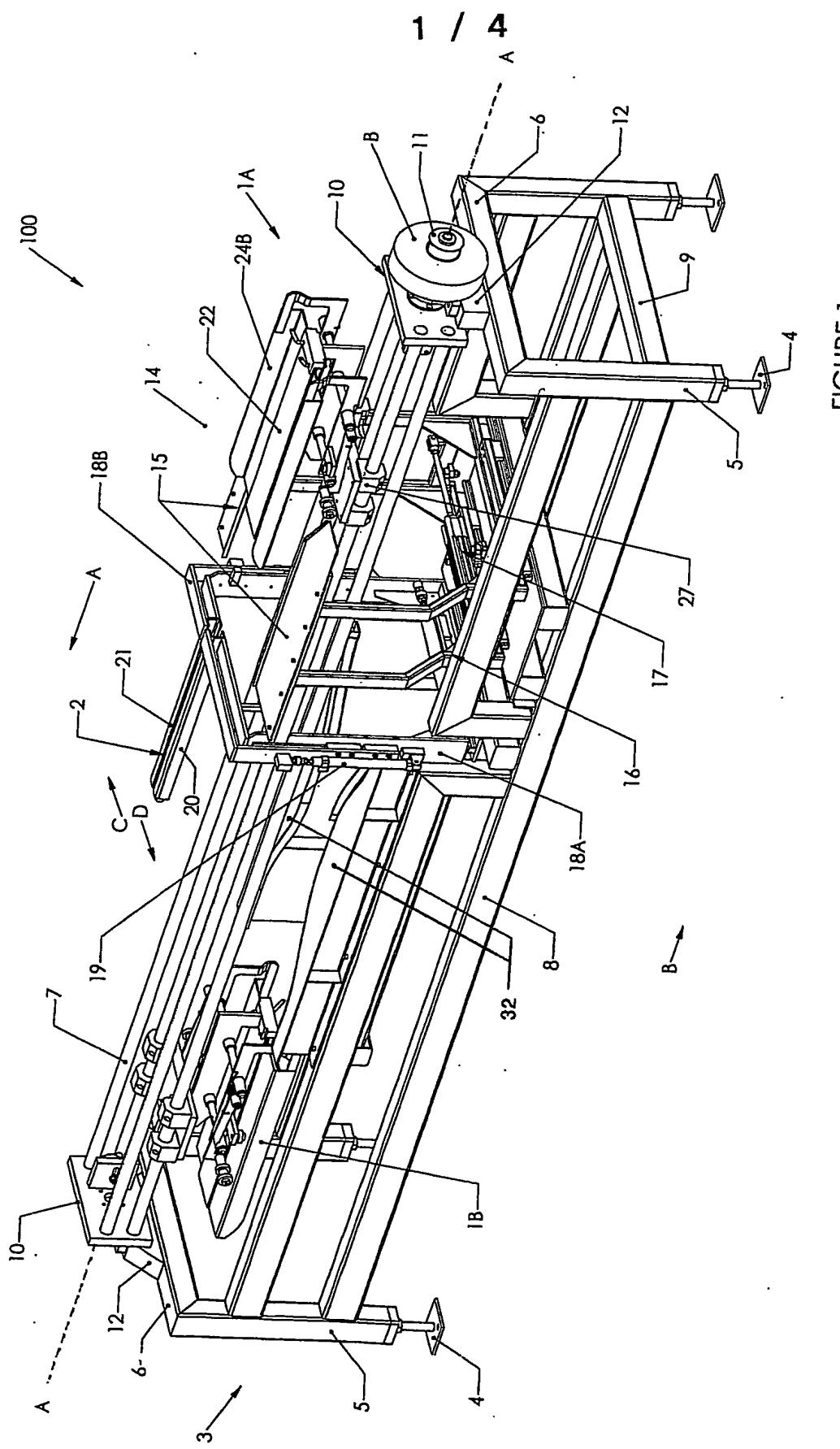


FIGURE 1

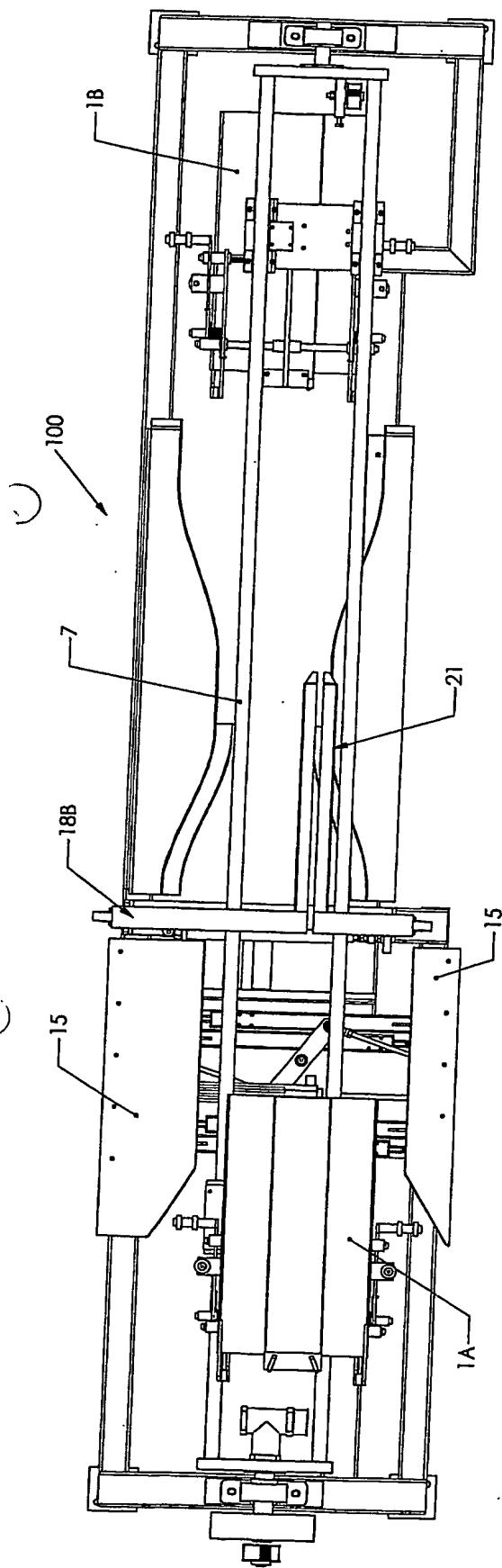


FIGURE 2

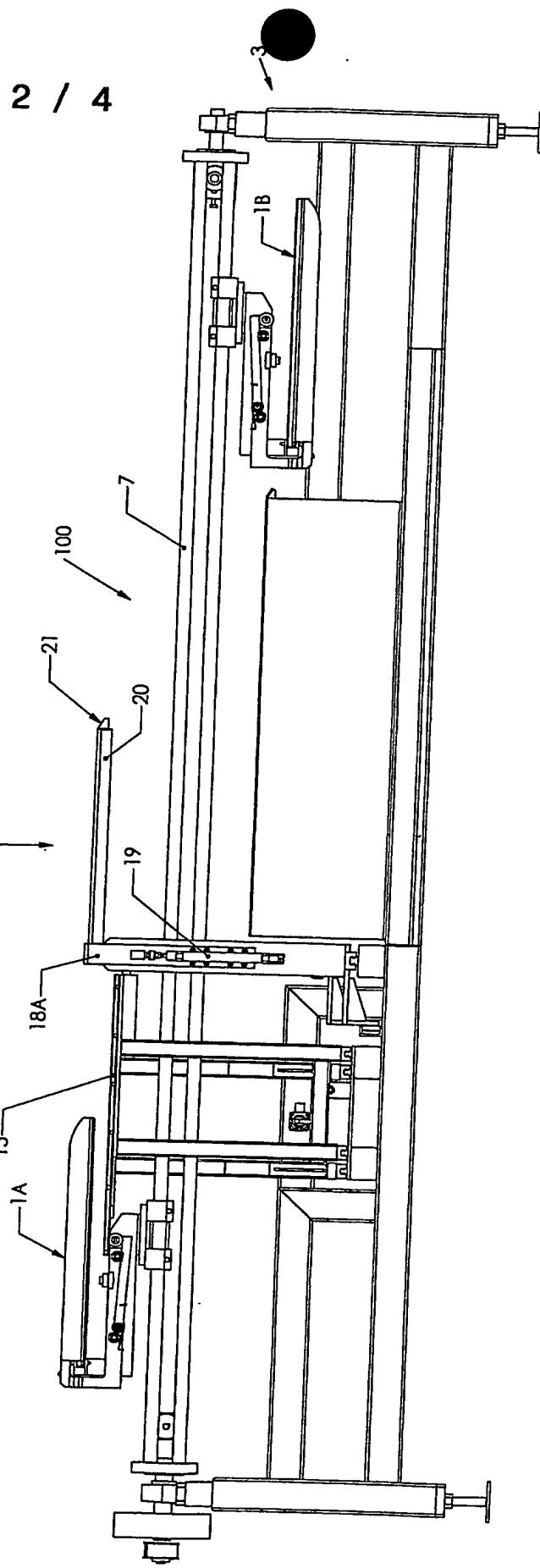
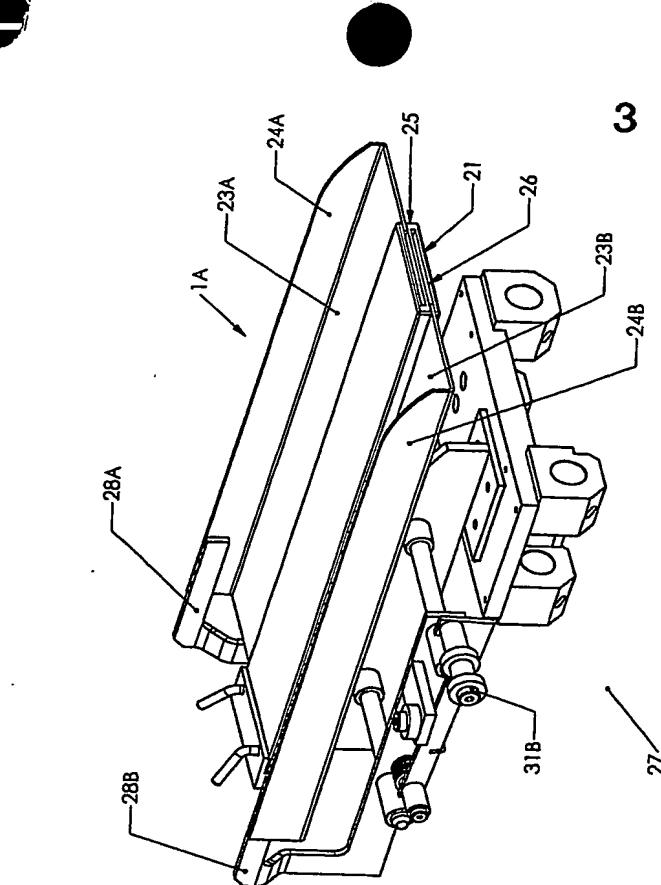


FIGURE 3



**FIGURE 4**

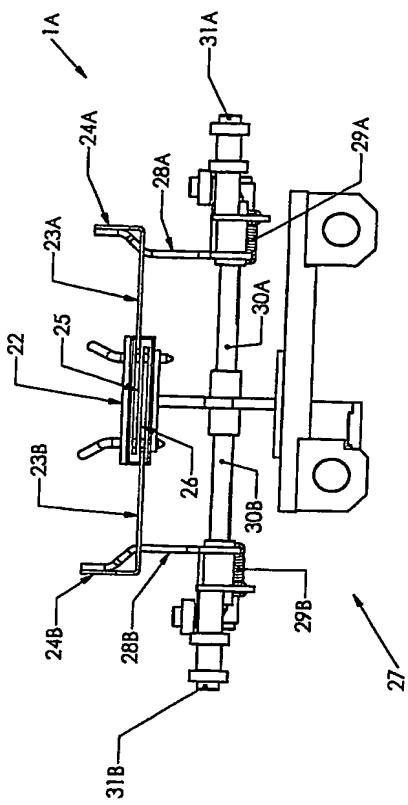
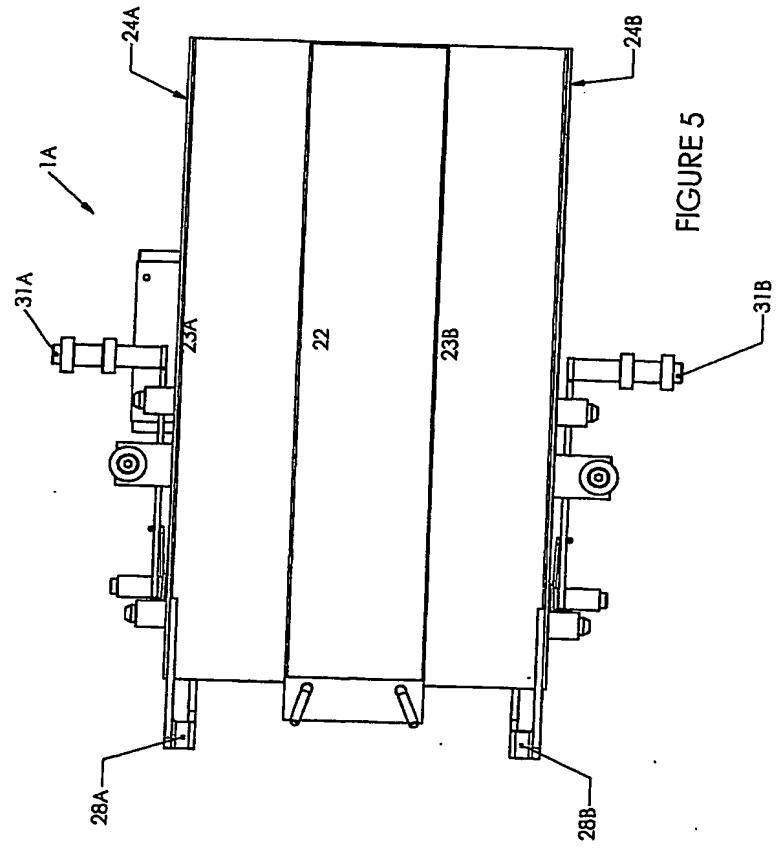


FIGURE 6



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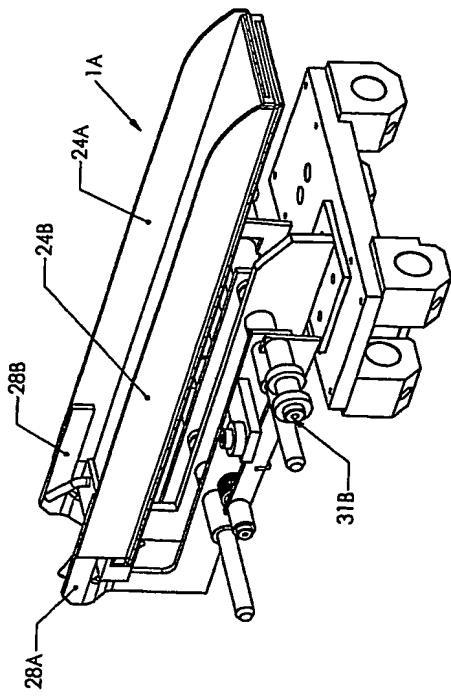


FIGURE 7

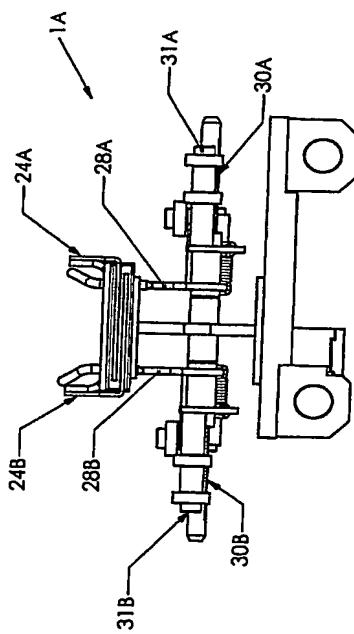


FIGURE 9

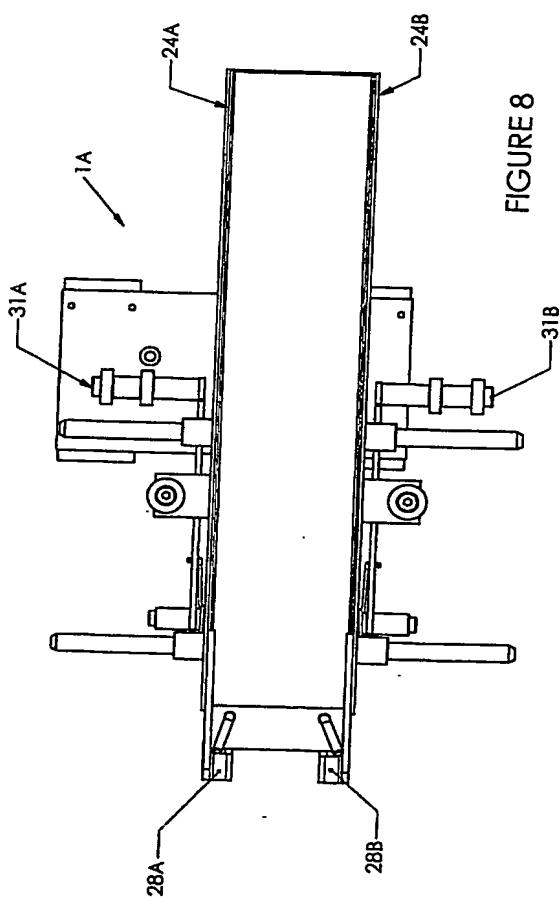


FIGURE 8